Fulcrum3D: Solar Forecasting for the NEM

LESSONS LEARNT REPORT 3

Project Details

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EXECUTIVE SUMMARY

- Our forecasting models continue to be more accurate than ASEFS such that they pass AEMO's accuracy requirements with respect to RMSE and MAE on 5-minute power production.
- Our Kidston forecast continues to be used in dispatch and is consistently outperforming ASEFS.
- The MP5F API is increasingly robust. A secure automated (or semi-automated) system for resetting passwords would be helpful.
- Overall forecast refinement is ongoing.
- Genex and UGL continue to be excellent project partners, we would like to acknowledge their invaluable contribution.
- The project is on track to meet its outcomes.

KEY LEARNINGS

1. Category: TECHNICAL

1.1. Objective: Demonstrate the ability to submit five-minute ahead self-forecasts via AEMO's web based MP5F API.

Lesson Learnt No. 1.1.1: SCADA integration is now the most complex part of the self-forecasting system.

Details: Real-time integration with the solar or wind farm SCADA system is critical to effective self-forecasting. The MP5F and our self-forecasting system have evolved to the extent that SCADA integration is now the most variable and complex component in the establishment of a self-forecasting system.

Lesson Learnt No. 1.1.2: A secure automated (or semi-automated) system for resetting the MP5F API passwords would be useful.

Details: The MP5F API is stable and has been materially streamlined in the last 12 months. The consistent requirement for password resets every 90 days is cumbersome and reliant on the participant. This process could be improved via a secure automated (or semi-automated) system for resetting passwords.

Lesson Learnt No. 1.1.3: A rounding feature in AEMO's dispatch engine appears to make it impossible to forecast accurately when the plant is at full capacity.

Details: A setting in AEMO's system appears to round the plant capacity down to the nearest MW in the dispatch engine. This means that it is impossible to forecast accurately when the plant is producing at full capacity and is permitted to do so.

Lesson Learnt No. 1.1.4: CloudCAM system hardware is robust.

Details: The CloudCAM system hardware has proved to be sufficiently robust in the high temperatures and often heavy rainfalls of Northern Queensland. It is was installed over 20 months ago and continues to operate well.

A small amount of water ingress in one of the nine CloudCAMs was detected and corrected for in software by Fulcrum3D. The cause of the water ingress was identified and rectified for subsequent builds, however the ability to detect and correct such issues in a rapid manner demonstrates the power of modern "smart sensors" and the upside of being the CloudCAM designer, integrator and OEM.

2. Category: COMMERCIAL

2.1. Objective: Demonstrate the potential commercial benefits of wind and solar farms investing in short-term, self-forecasting solutions.

Lesson Learnt No. 2.1.1: It is possible to satisfy AEMO's accuracy requirements and get to zero causer pays at wind and solar farms via MP5F under normal operations.
Details: We modelled the Causer Pays market and optimised our submissions for FCAS savings. We found that we could reduce the MPF (Market Participant Factor) and resulting Causer Pays charges to as low as zero in some months.

Lesson Learnt No. 2.1.2: Significant savings can be made with SCADA only forecasts.
Details: Our analysis found that a robust power model utilising low latency persistence data and real-time plant state SCADA information can deliver significant Causer Pays savings without wind or cloud forecasting systems. We expect that effective wind and cloud forecasting will be required to maximise FCAS savings as AWEFS, ASEFS and the FCAS markets evolve, or on-site self-forecasts are used for market bidding in the upcoming 5-minute market.

Lesson Learnt No. 2.1.3: We acknowledge the importance of operational safety systems and manual overrides.
Details: It is important to acknowledge the MP5F forecasts are being used in an operational power system and must have sufficient operational checks and safety systems along with manual overrides (this could simply be a documented process utilising AEMO's existing access control system and doesn't necessarily need to be a user interface on the system itself).